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Patent and Trademark Office

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/663,340 09/15/00 HAMADA

K PM 271420

EXAMINER

000909
PILLSBURY WINTHROP LLP
1600 TYSONS BOULEVARD
MCLEAN VA 22102

MMC2/1107

MONET, J	
ART UNIT	PAPER NUMBER

2826
DATE MAILED:

11/07/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Applicati n No.

09/663,340

Applicant(s)

HAMADA, KIMIMORI

Examiner

Johannes P Mondt

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☐ Claim(s) ____ is/are rejected.
- 7) ☒ Claim(s) 1-18 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Information Disclosure Statement

The examiner has considered the items listed in the Information Disclosure Statement of Paper No. 3.

Specification

The phrase "ladder-like" in the abstract (line 8) and everywhere in the "Detailed Description of Preferred Embodiment" (e.g., page 5) is vague and should be replaced by the phrase "ladder-shaped". The phrase "formed at a less depth" in the abstract should be replaced by "formed at a shallower depth".

Claim Objections

1. *Claims 1-12 are objected to* because of the following informalities:

With regard to claim 1:

(a) From the specification it is clear that the surface referred to on line 10 of page 10 on which this claim is formulated is *that* surface (out of the two major surfaces) of the body region that is *not* shared with the semiconductor substrate referred to on line 4 on the same page. However, nothing in the claim language clarifies this interpretation of the term "surface". The resulting lack of clarity can be removed by adding to the phrase "forming a body region of a first conductivity type formed in a semiconductor substrate" (lines 3 and 4 of page 10) the following text: "and having a major surface opposite to the surface shared between the semiconductor substrate and the body region"; said lack of

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clarity can then be removed by referring subsequently to "said major surface" instead of "a surface of the body region" on line 10. Appropriate correction is required.

(b) The phrase "the gate-insulating films" on line 11 is lacking antecedent basis and should be replaced by "films bordering and insulating the trench gates".

(c) The term "sandwiching the trench gates" needs to be made clearer. This could be done in accordance with the specification by replacing said term with "flanking the trench gates on both of their sides and being in contact with said trench gates through said films".

Claims 2-12 are objected to because of their dependence, directly or indirectly, on claim that is objected to, namely claim 1.

2. *Claims 2, 3, 6, 7, 10, 11, 14, and 15 are objected to* under 37 CFR 1.75(b), as being of improper dependent form for failing to further limit the subject matter of a previous claim. In particular, claim 1 proscribes the first semiconductor regions to sandwich the trench gates via the gate-insulating films, while in spite of the dependence of *claim 2* on claim 1 the entire further limitation of claim 2 proscribes a portion of the first semiconductor regions to sandwich the trench gates via the gate-insulating films, which proscription is thus automatically met through the dependence of claim 2 on claim 1. Applicant is required to cancel claim 2 for the reason given above. *Claims 3, 6, 7, 10, and 11* depend on claim 2 and thus should also be canceled. *Claim 14* is objected to because its dependence on claim 13 already implies the proscription that forms the sole

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further limitation of claim 14, in full analogy with the objection against claim 2 given above. *Claim 15* is objected to because it depends on claim 14.

3. *Claims 13-18 are objected to* because of the following informalities: *with regard to claim 13:*

(a) From the specification it is clear that the surface referred to on line 25 of page 12 on which this claim is formulated is *that* surface (out of the two major surfaces) of the body region that is *not* shared with the semiconductor substrate referred to on line 19 on the same page. However, nothing in the claim language clarifies this interpretation of the term "surface". The resulting lack of clarity can be removed by adding to the phrase "forming a body region of a first conductivity type formed in a semiconductor substrate" (lines 18 and 19 of page 12) the following text: "and having a major surface opposite to the surface shared between the semiconductor substrate and the body region"; said lack of clarity can then be removed by referring subsequently to "said major surface" instead of "a surface of the body region" on line 25, and likewise, on page 13, line 2, by referring to "said major surface" instead of "the surface". Appropriate correction is required.

(b) The expression "sandwich the trench gates " should be replaced by "flank the trench gates on both of their sides and are in contact with said trench gates through gate-insulating films". Appropriate action is required.

Claims 14-18 are objected to because of their dependence on a claim that is objected to, namely claim 13.

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4. *Claims 4 and 16 are objected to* because of the following informalities: "ladder-like" should be changed to "ladder-shaped" to avoid indefinite language. See also the objection against the specification. Appropriate correction is required.

Allowable Subject Matter

Claims 1-14 contain allowable subject matter. The following is a statement of reasons for the indication of allowable subject matter:

Unlike the present invention by Applicant, Williams does not teach the areas of the semiconductor regions between the trench gates to be deeper in the immediate vicinity of the trench gates and shallower in the area farther away from the trench gates so as to further reduce parasitic transistor operation.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Johannes P Mondt whose telephone number is 703-306-0531. The examiner can normally be reached on 8:00 - 18:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan J Flynn can be reached on 703-308-6601. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

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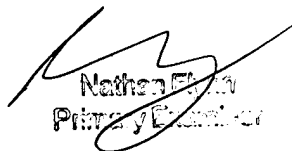
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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

JPM

November 5, 2001


Nathan Elton
Primary Examiner